

# Aurojit Panda

## Curriculum Vitae

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## Research Interests

Computer Systems, Distributed Systems, Networking

## Professional Employment

Aug 2018– **Assistant Professor**, *Courant Institute, New York University*, New York, NY.

Apr **Software Developer**, *Nefeli Networks*, Berkeley, CA.

2017–Aug 2018 ○ Working at a startup focused on network function orchestration and development. Nefeli builds on NetBricks, Bess, E2 and other research I have been involved in.

2011–2017 **Research Assistant**, *UC Berkeley*, Berkeley, CA.

2008–2011 **Software Developer**, *Microsoft*, Redmond, WA.

- Worked on the kernel for Midori, an experimental operating system based on Singularity.
- Designed, implemented and maintained Midori's performance counting and event logging infrastructure.
- Designed and implemented timer infrastructure for Midori. Midori relied purely on core-local time and allowed applications to specify a tradeoff between time accuracy and performance.
- Ported Midori from x86-64 to NVidia's Tegra2 multicore ARM processor.

Summer '07 **Software Engineering Intern**, *Electronic Arts*, Redwood City, CA.

- Developed memory management tools for the PlayStation 3.

Summer '06 **Software Engineering Intern**, *Bloomberg LP*, New York, NY.

- Developed network debugging tools for inferring the cause for latency spikes in data transfer from financial markets.

## Teaching Experience

Fall '13 **TA for EE122 (Undergraduate Networking)**, *UC Berkeley*, Berkeley, CA.

- Fall '12 ○ Taught about 20 students in a weekly discussion section.  
○ Designed problem sets and projects, ran a project involving plug computers

2006–2008 **Undergraduate TA**, *CS Department, Brown University*, Providence, RI.

- TAed CS51 (Models of Computation), CS138 (Distributed Computing), CS166 (Security), CS167 (Operating Systems) and CS169 (Operating Systems Lab).
- Helped with designing new content and projects for distributed systems and security.
- Helped design and grade problem sets and projects.

Fall '05 **Reader**, *Math Department, Brown University*, Providence, RI.

- Graded problem sets and exams for Honors Linear Algebra.

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## Education

2011–2017 **PhD candidate**, *University of California*, Berkeley, CA.

Advisor: Scott Shenker

2004–2008 **Sc.B. Math–Computer Science**, *Brown University*, Providence, RI.

Honors in Math–Computer Science

Advisor: Meinolf Sellmann

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## Awards

- Best Student Paper, SIGCOMM 2015
- Best Paper, EuroSys 2013
- Qualcomm Innovation Fellowship 2012

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## Publications

### Conferences

- Aurojit Panda, Ori Lahav, Katerina Argyraki, Mooly Sagiv, and Scott Shenker. Verifying Reachability in Networks with Mutable Datapaths. In *NSDI*, 2017.
- Aurojit Panda, Wenting Zheng, Xiaohe Hu, Arvind Krishnamurthy, and Scott Shenker. SCL: Simplifying Distributed SDN Control Planes. In *NSDI*, 2017.
- Marco Chiesa, Ilya Nikolaevskiy, Slobodan Mitrovic, Aurojit Panda, Andrei Gurtov, Aleksander Madry, Michael Schapira, and Scott Shenker. The Quest for Resilient (Static) Forwarding Tables. In *INFOCOM*, 2016.
- Ethan J Jackson, Melvin Walls, Aurojit Panda, Justin Pettit, Ben Pfaff, Jarno Rajahalme, Teemu Koponen, and Scott Shenker. SoftFlow: A Middlebox Architecture for Open vSwitch. In *USENIX ATC*, 2016.
- Oded Padon, Kenneth McMillan, Aurojit Panda, Mooly Sagiv, and Sharon Shoham. Ivy: Interactive Verification of Parametrized Systems via Effectively Propositional Reasoning. In *PLDI*, 2016.
- Aurojit Panda, Sangjin Han, Keon Jang, Melvin Walls, Sylvia Ratnasamy, and Scott Shenker. NetBricks: Taking the V out of NFV. In *OSDI*, 2016.
- Colin Scott, Aurojit Panda, Vjeko Brajkovic, George Necula, Arvind Krishnamurthy, and Scott Shenker. Minimizing Faulty Executions of Distributed Systems. In *NSDI*, 2016.
- Yaron Velner, Kalev Alpernas, Aurojit Panda, Alexander Rabinovich, Mooly Sagiv, Scott Shenker, and Sharon Shoham. Some Complexity Results for Stateful Network Verification. In *TACAS*, 2016.
- Shoumik Palkar, Chang Lan, Sangjin Han, Aurojit Panda, Keon Jang, Sylvia Ratnasamy, Luigi Rizzo, and Scott Shenker. E2: A Framework for Network Function Virtualization. In *SOSP*, 2015.

- Justine Sherry, Peter X. Gao, Soumya Basu, Aurojit Panda, Arvind Krishnamurthy, Christian Maciocco, Maziar Manesh, João Martins, Sylvia Ratnasamy, Luigi Rizzo, and Scott Shenker. Rollback Recovery for Middleboxes. In *SIGCOMM*, 2015.
- Colin Scott, Andreas Wundsam, Barath Raghavan, Aurojit Panda, Andrew Or, Jefferson Lai, Eugene Huang, Zhi Liu, Ahmed El-Hassany, Sam Whitlock, H.B. Acharya, Kyriakos Zarifis, and Scott Shenker. Troubleshooting Blackbox SDN Control Software with Minimal Causal Sequences. In *SIGCOMM*, 2014.
- Shivaram Venkatraman, Aurojit Panda, Ganesh Ananthanarayanan, Michael Franklin, and Ion Stoica. The Power of Choice in Data-Aware Cluster Scheduling. In *OSDI*, 2014.
- Sameer Agarwal, Barzan Mozafari, Aurojit Panda, Henry Milner, Samuel Madden, and Ion Stoica. BlinkDB: Queries with Bounded Errors and Bounded Response Times on Very Large Data. In *EuroSys*, 2013. Best Paper.
- Junda Liu, Aurojit Panda, Ankit Singla, Brighten Godfrey, Michael Schapira, and Scott Shenker. Ensuring Connectivity via Data Plane Mechanisms. In *NSDI*, 2013.
- Joan Feigenbaum, Brighten Godfrey, Aurojit Panda, Michael Schapira, Scott Shenker, and Ankit Singla. Brief Announcement: On the Resilience of Routing Tables. In *PODC*, 2012.
- Daniel Heller, Aurojit Panda, Meinolf Sellmann, and Justin Yip. Model Restarts for Structural Symmetry Breaking. In *CP*, 2008.

### **Journals**

- James McCauley, Zhi Liu, Aurojit Panda, Teemu Koponen, Barath Raghavan, Jennifer Rexford, and Scott Shenker. Recursive SDN for Carrier Networks. *SIGCOMM Computer Communication Review*, 46(3), 2016.
- Aurojit Panda, James Murphy McCauley, Amin Tootoonchian, Justine Sherry, Teemu Koponen, Sylvia Ratnasamy, and Scott Shenker. Open Network Interfaces for Carrier Networks. *SIGCOMM Computer Communication Review*, 46(1):5–11, 2016.

### **Workshops**

- Abhiram Balasubramanian, Marek S. Baranowski, Anton Burtsev, Aurojit Panda, Zvonimir Rakamaric, and Leonid Ryzhyk. System Programming in Rust: Beyond Safety. In *HotOS*, 2017.
- Aurojit Panda, Mooly Sagiv, and Scott Shenker. Verification in the Age of Microservices. In *HotOS*, 2017.
- Ignacio Castro, Aurojit Panda, Barath Raghavan, Scott Shenker, and Sergey Gorinsky. Route Bazaar: Automatic Intedomain Contract Negotiation. In *HotOS*, 2015.
- Aurojit Panda, Katerina Argyraki, Mooly Sagiv, Michael Schapira, and Scott Shenker. New Directions for Network Verification. In *SNAPL*, 2015.

- Wenfei Wu, Li Erran Li, Aurojit Panda, and Scott Shenker. PRAN: Programmable Radio Access Networks. In *HotNets*, 2014.
- Sangjin Han, Norbert Egi, Aurojit Panda, Sylvia Ratnasamy, Guangyu Shi, and Scott Shenker. Network Support for Resource Disaggregation in Next-Generation Datacenters. In *HotNets*, 2013.
- James McCauley, Aurojit Panda, Martin Casado, Teemu Koponen, and Scott Shenker. Extending SDN to Large-Scale Networks. In *ONS Research Track*, 2013.
- Kay Ousterhout, Aurojit Panda, Joshua Rosen, Shivaram Venkataraman, Reynold Xin, Sylvia Ratnasamy, Scott Shenker, and Ion Stoica. The Case for Tiny Tasks in Compute Clusters. In *HotOS*, 2013.
- Aurojit Panda, Colin Scott, Ali Ghodsi, Teemu Koponen, and Scott Shenker. CAP for Networks. In *HotSDN*, 2013.
- Debayan Gupta, Aaron Segal, Aurojit Panda, Gil Segev, Michael Schapira, Joan Feigenbaum, Jenifer Rexford, and Scott Shenker. A New Approach to Interdomain Routing Based on Secure Multi-Party Computation. In *HotNets*, 2012.

### **Demos**

- Sameer Agarwal, Anand P Iyer, Aurojit Panda, Samuel Madden, Barzan Mozafari, and Ion Stoica. Blink and It's Done: Interactive Queries on Very Large Data. In *VLDB*, 2012.

### **Technical Reports**

- Marco Chiesa, Ilya Nikolaevkiy, Aurojit Panda, Andrei Gurtov, Michael Schapira, and Scott Shenker. Exploring the Limits of Static Failover Routing. *arXiv preprint arXiv:1409.0034*, 2014.
- Aurojit Panda, Ori Lahav, Katerina Argyraki, Mooly Sagiv, and Scott Shenker. Verifying Isolation Properties in the Presence of Middleboxes. *arXiv preprint arXiv:1409.7687*, 2014.

## **Talks**

### **NetBricks: Taking the V out of NFV**

- OSDI. November 2016
- Intel Research. October 2016
- Google Platforms and Networking. October 2016

### **VMN: Verifying Networks with Mutable Datapaths**

- Invited speaker at NetPL. August, 2016.
- Summit on Advances in Programming Languages (SNAPL). May 2015.
- Dagstuhl - Formal Foundations for Networking. February 2015.

### **Ensuring Connectivity via Dataplane Mechanisms**

- NSDI. April 2013.

## Service

- **Reviewing** Reviewer for Journal of Applied Logic. External Reviewer for ESOP 2017, POPL 2017, SOSR 2016, PLDI 2015, ICDE 2013. Helped review papers for SIGCOMM 2016, HotNets 2015, SIGCOMM 2015, NSDI 2014, EuroSys 2013, SoCC 2012.
- Industry Liaison for the Berkeley Computer Science Graduate Student Association.

## References

### **Prof. Scott Shenker**

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University of California, Berkeley  
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### **Prof. Ion Stoica**

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University of California, Berkeley  
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### **Prof. Katerina Argyraki**

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Ecole Polytechnique Federale de Lausanne  
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### **Prof. Sylvia Ratnasamy**

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### **Prof. Mooly Sagiv**

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